# B. STUDY AREA ROADWAY CHARACTERISTICS

## 1. Location

US 421 is the primary north-south route in the Study Area, and runs through central Jefferson and Ripley Counties, passing through the communities of Madison, Versailles and Osgood (see Figure 2). US 50, the primary east-west route, passes through central Dearborn and Ripley Counties and links the Study Area to I-275 at Cincinnati to the east and I-65 at Seymour to the west. Between Indianapolis and Cincinnati, I-74 runs along the northern edge of the Study Area. Running from Louisville to Cincinnati, I-71 is located just south of the Study Area in Kentucky. I-275 in Cincinnati serves as the beltway interconnecting I-71, I-74, I-75 and US 50.

## 2. Existing Routes

In addition to US Routes 50 and 421, the transportation network in the five-county area of Dearborn, Jefferson, Ohio, Ripley and Switzerland Counties includes State Roads 56, 62, 101, 129, 156, and 250. Access to Interstate 74 to the north and I-65 to the west is provided by this network. This network also provides connections to I-71 via US 421 over the Ohio River at Madison and via US 42 and KY 35 over the Ohio River at the Markland Dam. Finally, US 50 in Lawrenceburg ties to I-275 which serves the Cincinnati metropolitan area and crosses the Ohio River into northern Kentucky to I-71/I-75. Thus, bridges link the Study Area to northern Kentucky on roughly a 30-mile spacing between the US 421 bridge in Madison, the Markland Dam Bridge near Vevay, and the I-275 Ohio River Bridge near Lawrenceburg. Table 4 summarizes the Study Area roadway characteristics. (Detailed roadway characteristics appear in Appendix Table A-1.)

**US 50.** US 50 is classified as a ìrural principal arterial.î Part of the National Highway System (NHS), this route passes through south-central Indiana, and links the Study Area to Cincinnati on the east and I-65 near Seymour on the west. Except for I-74 on the north edge of the Study Area and I-71 just south of the Study Area, US 50 is the only route with east-west continuity through the Study Area.

**US 421.** US 421 is classified as a ìrural principal arterial,î and links Madison in Jefferson County to I-74 at Greensburg. US 421 also extends as a ìrural minor arterialî in Kentucky over the Ohio River to I-71 in Kentucky. On the west edge of the Study Area, this is the only route with north-south continuity from I-74 to I-71.

**SR 129.** SR 129 is classified as a ìrural minor arterialî (Ripley County) and a ìrural major collectorî (Ripley and Switzerland Counties). This is the only route in the Study Area east of US 421 that passes throughout the north-south length of the Study Area. However, the route lacks continuity near Versailles where those driving on SR 129 must use US 50 for approximately two miles to continue on the route.

**SR 56 and SR 156 .** SR 56 from Madison to Vevay and SR 156 from Vevay to Aurora are ìrural minor arterialsî that parallel the Ohio River tying Madison to Lawrenceburg.

**SR 56 and SR 62.** SR 56 (east of Vevay) and SR 62 are east-west ìrural major collectorsî linking Madison through the Study Area to Lawrenceburg. While the routes have continuity, the actual roadways lack continuity because diversions from the primary direction occur on other routes.

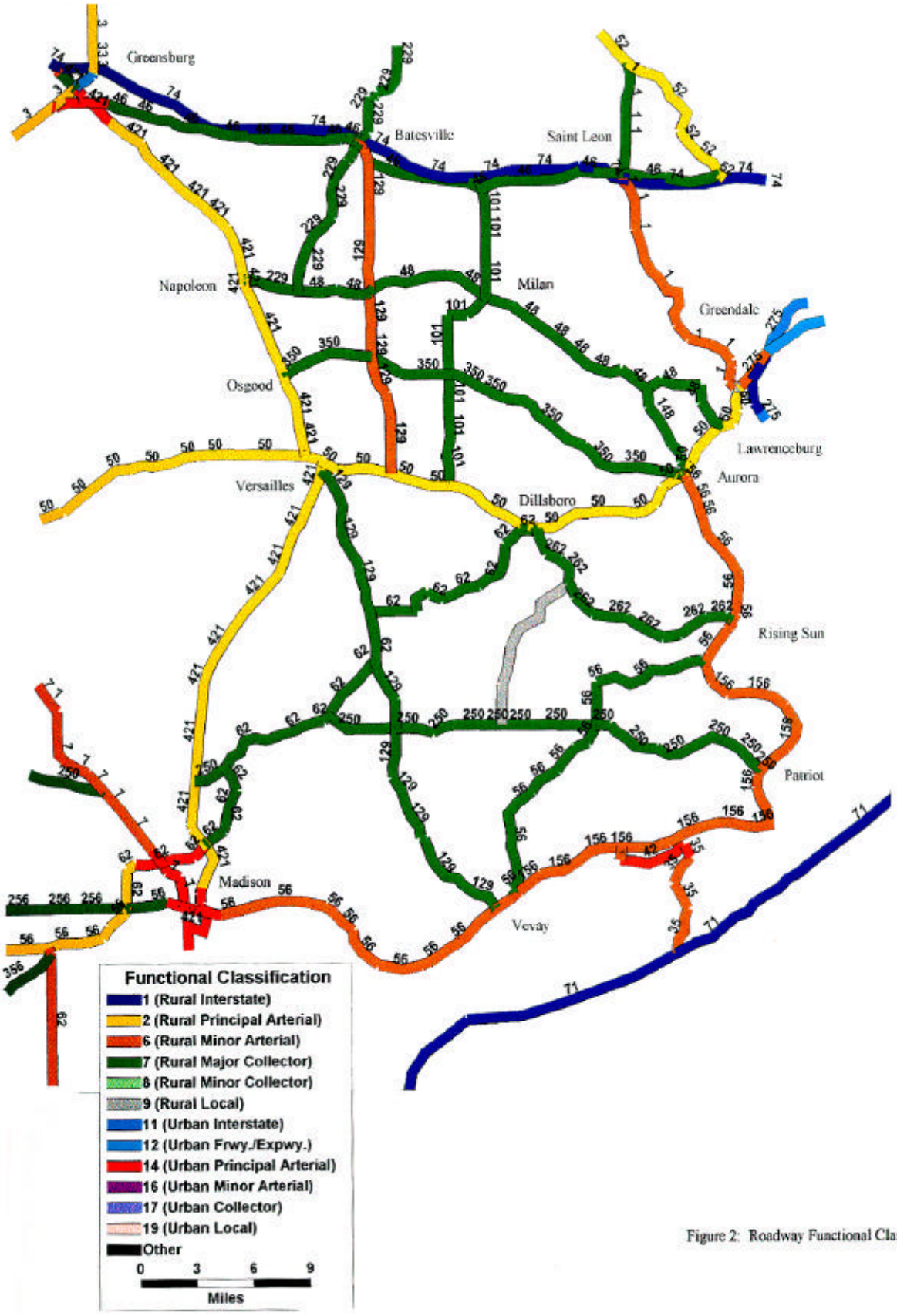


Figure 2: Roadway Functional Class

## Table 4: Summary of Roadway Characteristics

(Dearborn, Jefferson, Ohio, Ripley and Switzerland Counties in Indiana
plus US 42 and KY 35 in Kentucky)

| Route | Segment | Functional Class | No. of Lanes | Pavement | Shoulders* | 1998 AADT | Curves per Mile** | Comments |
|---|---|---|---|---|---|---|---|---|
| **US 50** | US 421 at Versailles to SR 101 | Principal Arterial | 2 | 24' | 4' | 6,900 | 55mph-40mph: 0.14 | 2 to 3 lanes |
| | SR 101 to Lawrenceburg | Principal Arterial | 4 | 2 @ 24' median divided | 0' to 4' | 6,120 to 34,059 | 55mph-40mph: 0.05<br>40mph-20mph: 0 | Aurora to Lawrenceburg has 4-lanes with center turn lane |
| | Lawrenceburg to US 50/ I-275 Connector | Principal Arterial | 6 | 2 @ 36' | 0 | 37,514 | 55mph-40mph: 0<br>40mph-20mph: 0 | 6-lane with continuous center turn lane |
| | US 50/I-275 Connector to Ohio State Line | Principal Arterial | 4 | 2 at 24' median divided | 0 | 12,271 | 55mph-40mph: 0<br>40mph-20mph: 0 | |
| **US 421** | SR 56 at Madison to SR 62 | Principal Arterial | 4 | 2 at 24' divided | 4' to 7' | 13,680 to 9,160 | 55mph-40mph: 0 | |
| | SR 62 to US 50 at Versailles | Principal Arterial | 2 | 24' | 0' to 3' | 2,330 to 16,260 | 55mph-40mph: 0.11<br>40mph-20mph: 0.04 | |
| | US 50 at Versailles to I-74 | Principal Arterial | 2 | 22' to 24' | 2' to 4' | 4,950 to 8,770 | 55mph-40mph: 0.11<br>40mph-20mph: 0.04 | |
| **SR 56** | US 421 at Madison to SR 156 at Vevay | Minor Arterial | 2 | 20' to 22' | 0' to 3' | 4,700 to 6,313 | 55mph-40mph: 0.38<br>40mph-20mph: 0 | Rolling pavement, winding roadway |
| | SR 156 at Vevay to SR 250 at E. Enterprise | Major Collector | 2 | 19' to 20' | None | 3,467 to 2,168 | 55mph-40mph: 0.69<br>40mph-20mph: 0.65 | Dangerous Curves near Vevay |
| | SR 250 at E. Enterprise to Aberdeen | Major Collector | 2 | 20' | None | 1,998 | 55mph-40mph: 1.04<br>40mph-20mph: 1.09 | Right-of-wayis tight through East Enterprise |
| | Aberdeen to SR 156 | Major Collector | 2 | 19' | None | 1,369 | 55mph-40mph: 1.04<br>40mph-20mph: 1.09 | 3 lanes at east end, rolling with many curves |
| | SR 156 to SR 262 at Rising Sun | Minor Arterial | 2 | 20' to 24' | 2' to 3' | 4,366 to 10,658 | 55mph-40mph: 1.04<br>40mph-20mph: 1.09 | Scenic Route |
| | SR 262 at Rising Sun to US 50 at Aurora | Minor Arterial | 2 | 22' to 24' | 2' paved | 8,093 to 12,690 | 55mph-40mph: 0.91<br>40mph-20mph: 1.05 | Scenic Route |
| **SR 62** | SR 129 to US 50 at Dillsboro (Chief White Eye Trail) | Major Collector | 2 | 18' to 22' | None | 450 to 2,707 | 55mph-40mph: 1.54<br>40mph-20mph: 1.76 | Sharp curves, hills, trucks canít use |
| **SR 101** | US 42 over Markland Dam to SR 156 | Minor Arterial | 2 | Wide 2-lane | Yes | 2,000 | N/A | Good condition |
| | US 50 to I-74 | Major Collector | 2 | 24' | 0' to 1' | 2,190 to 6,080 | 40mph-20mph: 0.21 | |
| **SR 129** | SR 56 to SR 250 | Major Collector | 2 | 18' | None | 1,329 | 55mph-40mph: 1.51<br>40mph-20mph: 0.58 | Under design Reconstruction- 2003 |
| | SR 250 to US 421 | Major Collector | 2 | 24' | 2' paved + 3' gravel | 1,249 to 3,720 | N/A | New section level |
| | US 50 to SR 46 | Minor Arterial | 2 | 24' | 11' | 2,860 to 7,120 | N/A | |

Source: Bernardin-Lochmueller & Associates, Inc. from INDOT and Kentucky Transportation Cabinet data; and Dyer Environmental Services

Notes: * Shoulders may be paved, gravel, earth or combination thereof.

** Pavement Management System: ì1994 Horizontal Curvature Dataî; INDOT, Division of Roadway Management.

**Table 4 (continued): Summary of Roadway Characteristics**

| Route | Segment | Functional Class | No. of Lanes | Pavement | Shoulders* | 1998 AADT | Curves per Mile** | Comments |
|---|---|---|---|---|---|---|---|---|
| **SR 156** | SR 56 at Vevay to SR 101 at Markland Dam | Minor Arterial | 2 | 22' | 2' to 3' | 7,203 to 3,329 | 55mph-40mph: 0.38<br>40mph-20mph: 0 | Rolling pavement, scenic route |
| | SR 101 at Markland Dam to SR 250 at Patriot | Minor Arterial | 2 | 22' | 1' to 3' | 1,173 to 2,188 | 55mph-40mph: 0.38<br>40mph-20mph: 0 | Rolling, winding , scenic route |
| | SR 250 at Patriot to SR 56 (Ohio Co.) | Minor Arterial | 2 | 22' | 1' to 4' | 1,717 to 3,288 | 55mph-40mph: 0.38<br>40mph-20mph: 0 | Scenic Route |
| **SR 250** | SR 129 to SR 56 | Major Collector | 2 | 18' | 0' to 1' | 699 to 1,219 | N/A | Rolling, Amish signs from Fairview to Pleasant |
| | SR 56 to SR 156 | Major Collector | 2 | 18' | 1' | 1,469 to 599 | N/A | |
| **SR 262** | US 50 to SR 56 at Rising Sun | Major Collector | 2 | 18' to 22' | 0' to 1' | 3,526 to 4,845 | N/A | |
| **US 42** | US 421 to Gallatin Co. Line | Major Collector | 2 | 20' to 22' | 1' | 2,583 to 9,008 | N/A | |
| | Gallatin Co. Line to KY 35 | Major Collector | 2 | 24' | 1' to 8' | 4,293 | N/A | |
| | KY 35 to I-71/75 | Major Collector | 2 | 20' to 22' | 1' to 4' | 3,406 to 5,532 | N/A | |
| **KY 35** | I-71 to US 42 | Major Collector | 2 | 20' to 22' | 1' to 2' | 1,615 to 3,133 | N/A | |

Source: Bernardin-Lochmueller & Associates, Inc. from INDOT and Kentucky Transportation Cabinet data; and Dyer Environmental Services

Notes: * Shoulders may be paved, gravel, earth or combination thereof.

** Pavement Management System: ì1994 Horizontal Curvature Dataî; INDOT, Division of Roadway Management.

**SR 101.** As aì rural major collector,î existing SR 101 extends as a north-south route from I-74 to US 50, and connects SR 156 over the Markland Dam to US 42 in Kentucky.

**US 42.** Once the primary route from Louisville to Cincinnati, US 42 was replaced by I-71. Paralleling the Ohio River in Kentucky, US 42 is classified as a ì rural major collectorî from US 421 in Trimble County through Carroll and Gallatin Counties to I-71/75 in Boone County. West of Warsaw, US 42 links SR 101 to KY 35 which interchanges with I-71 south of Warsaw.

**KY 35.** KY 35 from US 42 in Warsaw to I-71 is a two-lane ì rural major collectorî except for a short four-lane divided segment from the entrance to the Kentucky Speedway to I-71.

### 3. Systems

US 50 and US 421 are classified as ì rural principal arterials,î and are part of the Indiana ì Rural Principal and Minor Arterial System.î US 50 is also part of the National Highway System of about 155,000 miles nationwide. The Indiana Arterial System also includes SR 1 from I-74 to US 50, SR 56/SR 156 along the Ohio River, SR 101 across the Markland Dam, and SR 129 from I-74 to US 50 as ì rural minor arterialsî in the Study Area. Other State roads in the Study Area, including SR 101 from I-74 to US 50, are classified as ì rural major collectors.î US 42 from US 421 to I-71/75 and KY 35 from US 42 to I-71 are classified as ì rural major collectorsî in Kentucky.

## 4. Existing Geometrics

**Lane and Shoulder Widths. US 50** in Dearborn County is a four-lane divided highway with 12-foot lanes and no shoulder. A portion of US 50 from Lawrenceburg to the US 50/I-275 Connector has six lanes with a continuous center turn-lane. In Ripley County, US 50 changes from a four-lane divided highway east of SR 101 to a two-lane roadway with 12-foot lanes and 4-foot shoulders west of SR 101.

Beginning at the Ohio River (milepoint 0.00) northward to SR 56 (milepoint 0.42), **US 421** in Madison has two travel-lanes of 15 to 18 feet on the approach to the Ohio River Bridge. For the common segment in Madison with SR 56 (milepoint 0.42 to milepoint 0.70), US 421 increases to four moving-lanes that vary in width from 11 to 12 feet with parking-lanes on both sides. Northward from SR 56 in Madison, US 421 continues as a four-lane facility, with parking on both sides only in town. North of SR 62 (milepoint 5.16), US 421 transitions to two 12-foot lanes with 3-foot shoulders for the balance of the route in Jefferson County. In Ripley County, US 421 has two lanes of 12 feet in width with 2 to 4-foot shoulders.

From US 421 in Madison to SR 156 in Vevay, rural **SR 56** is a two-lane facility with 10 to 11-foot lanes and 1 to 2-foot shoulders. From SR 156 at Vevay in Switzerland County to SR 156 in Ohio County, SR 56 has 10-foot lanes without shoulders. Northward from SR 156, SR 56 has two 12-foot lanes with 2-foot shoulders in Ohio County and two 12-foot lanes without shoulders in Dearborn County as it enters Aurora to end at US 50.

Entering Jefferson County, **SR 62** is a two-lane highway with 12-foot lanes and 5 to 8-foot shoulders. From west of SR 7 to US 421, SR 62 is a four-lane divided facility with 12-foot lanes and 6 to 10-foot shoulders. Eastward from US 421 in Jefferson County through Ripley County to US 50 at Dillsboro in Dearborn County (where SR 62 continues as a common segment with US 50), SR 62 is a two-lane facility having 9-foot lanes with little or no shoulder.

Passing over the Markland Dam, SR 101 in Switzerland County links SR 156 in Indiana to US 42 in Kentucky. Between US 50 and I-74 in Ripley County, **SR 101** is a two-lane facility with 12-foot lanes and 1-foot shoulders.

From SR 56 north to SR 250 in Switzerland County, **SR 129** has two lanes of 9 feet in width with 1-foot shoulders. (This section of SR 129 from SR 56 to SR 250 is scheduled for reconstruction in the year 2003). From SR 250 to US 421, SR 129 has been reconstructed with two 12-foot lanes and a 5-foot shoulder (2' paved). Between US 50 and I-74, **SR 129** in Ripley County has two lanes, 12 feet in width with 11-foot shoulders.

In Kentucky, rural **US 42** from US 421 to the Gallatin County Line has two lanes of 10 to 11 feet in width with 1-foot shoulders. From the Gallatin County Line through the intersection with SR 101 to KY 35 in Warsaw, US 42 is a two-lane facility with 12-foot lanes and 1 to 8-foot shoulders. East of KY 35 in Gallatin County to immediately west of I-71/75 in Boone County, US 42 narrows to two lanes of 10 to 11 feet in width with shoulders varying from 1 to 4 feet in width.

From US 42 in Warsaw to I-71, **KY 35** is a two-lane facility of 10 to 11 feet in width with 1 to 2-foot shoulders. For a short segment from the main entrance to the Kentucky Speedway to I-71, KY 35 is a four-lane divided facility.

**Horizontal Curves.** In addition to lane and shoulder width, the number of curves per mile were determined. Table 5 shows for each direction of each route, the number of curves per mile falling in operating speed ranges. If there is more than one curve per mile that drops the operating speed below 55 mph, the roadway is cause for concern. If the number of 55 to 40 mph curves and 40 to 20 mph curves add up to a number greater than one, again, there is cause for concern. SR 56, SR 62 and SR 129 are the roadways with the highest number of curves per mile.

From the 1994 horizontal curvature data collected by the INDOT Division of Roadway Management for the Roadway Management System, INDOT extracted the portion of the database on horizontal curvature by ì reference mile postî for the five-county SR 101 Study Area. Then, this information was summarized by direction (north, south, east, west) for each of the five counties, and the degree of curvature was used to categorize the curves into operating speed ranges of 55 to 40 mph (degree of curvature greater than 5.25 degrees and up to 11.25) and 40 to 20 mph (degree of curvature greater than 11.25 and up to 49.25). Finally, the length of the route in each county by direction was used to determine the curves per mile in the curvature ranges. No attempt was made to analyze the curvature data below the county level due to differences in the milepoint reference systems used in the INDOT Roadway Inventory System and the Roadway Management System.

## 5. Existing and Forecasted Traffic Volumes

Existing daily traffic volumes based on actual ground counts and volume-to-capacity (v/c) ratios in the Study Area appear in Figure 3. A volume-to-capacity ratio of 0.70 roughly corresponds to a level-of-service (LOS) rating of ìCî and a v/c ratio of 1.00 approximates LOS E. The desirable operating condition for rural facilities is a v/c ratio of 0.70 or less (LOS C or better). US 50 carried from 4,150 to 37,514 vehicles per day (vpd) in 1998. The highest volumes in this corridor were observed in Dearborn County between milepoints 16.6 and 19.1 through Lawrenceburg where the v/c ratio approaches 0.84 (LOS D). As it leaves Lawrenceburg, SR 1 northward from US 50 appears to be at capacity with a v/c ratio of 1.00. US 50 from US 421 in Versailles to SR 129 also has a v/c ratio approaching 0.84. Excluding Madison, the highest volumes on US 421 occurred in Ripley County between milepoints 12.07 and 12.46 in Versailles at the intersection with US 50. The highest volumes on SR 129 also occurred in Ripley County between milepoints 13.59 and 15.95 near Batesville, just south of I-74. A narrow, winding roadway with steep grades, SR 7 between SR 56 and SR 62 in Madison appears to be at capacity with a v/c ratio of 1.00.

## 6. Adequacy

Future traffic volumes show more congestion reflected in an increase in the volume-to-capacity ratios and a drop in the levels-of-service (LOS) for most roadways in the Study Area. Figure 4 identifies daily traffic volumes in the year 2025 with committed roadway improvements. (Referring to Section D, the significant committed roadway improvements include reconstruction of SR 1 from SR 46 to US 50 at Lawrenceburg, relocation of SR 48 northward from US 50 in Lawrenceburg, reconstruction of SR 56 from Madison to SR 129 near Vevay, reconstruction of SR 129 from SR 250 to SR 56, a new connector from the Markland Dam Bridge at US 42 to I-71 in Kentucky, and widening of US 42 from Carrollton to the Markland Dam Bridge.) US 50 from Aurora to Lawrenceburg is at capacity with a v/c ratio near 1.0. The congestion on US 50 from US 421 in Versailles to SR 129 continues, and congestion on US 421 leading away from Versailles is now evident. Despite reconstruction, congestion continues on SR 1 near Lawrenceburg; and SR 7 congestion in Madison now extends northward from SR 62. Increased traffic volumes are also evident on SR 156 from SR 129 through Vevay to SR 101, and in the vicinity of the intersections of SR 56 with SR 156 and SR 262 in Ohio County as v/c ratios approach or exceed 0.70.

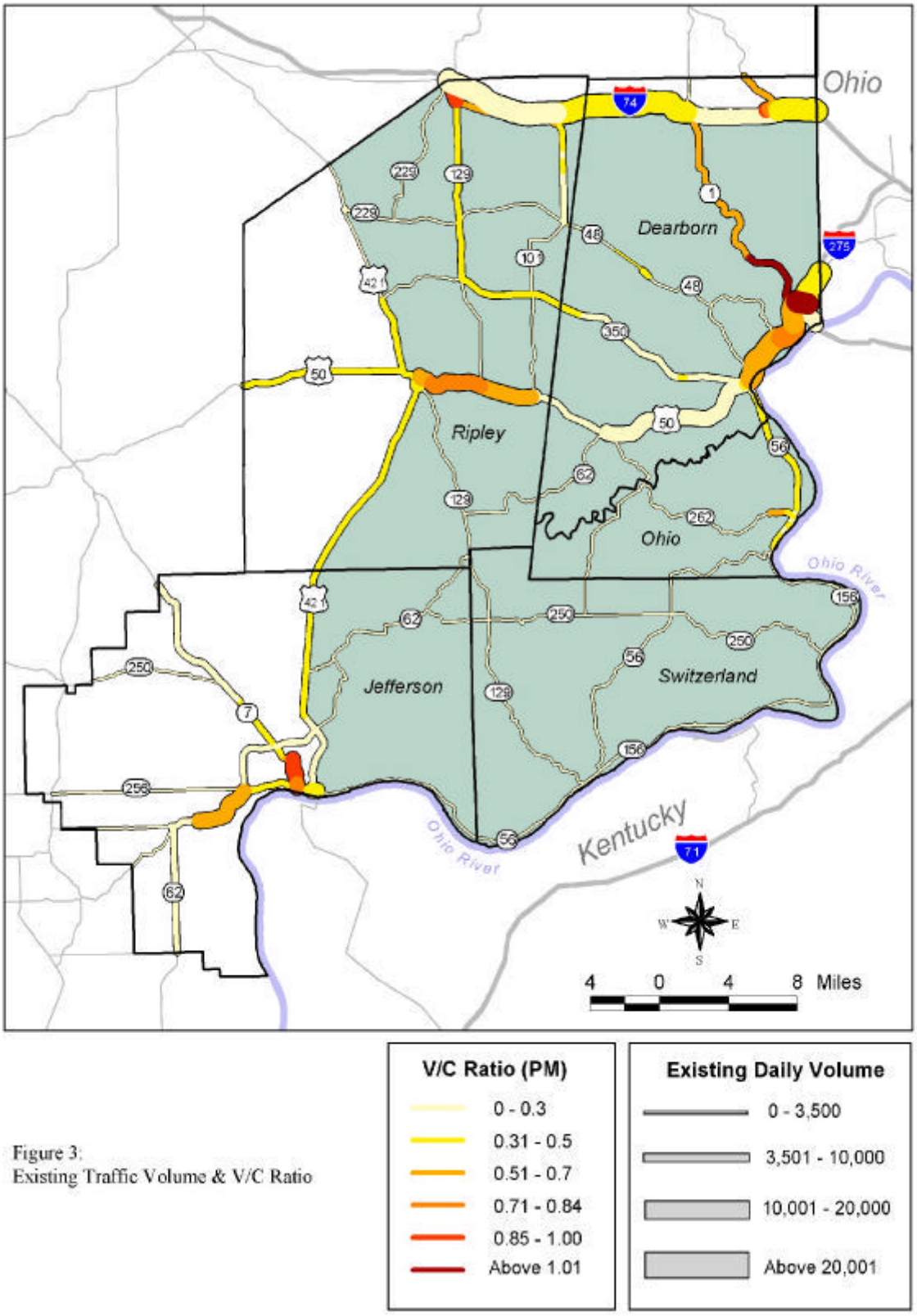


Figure 3:
Existing Traffic Volume & V/C Ratio

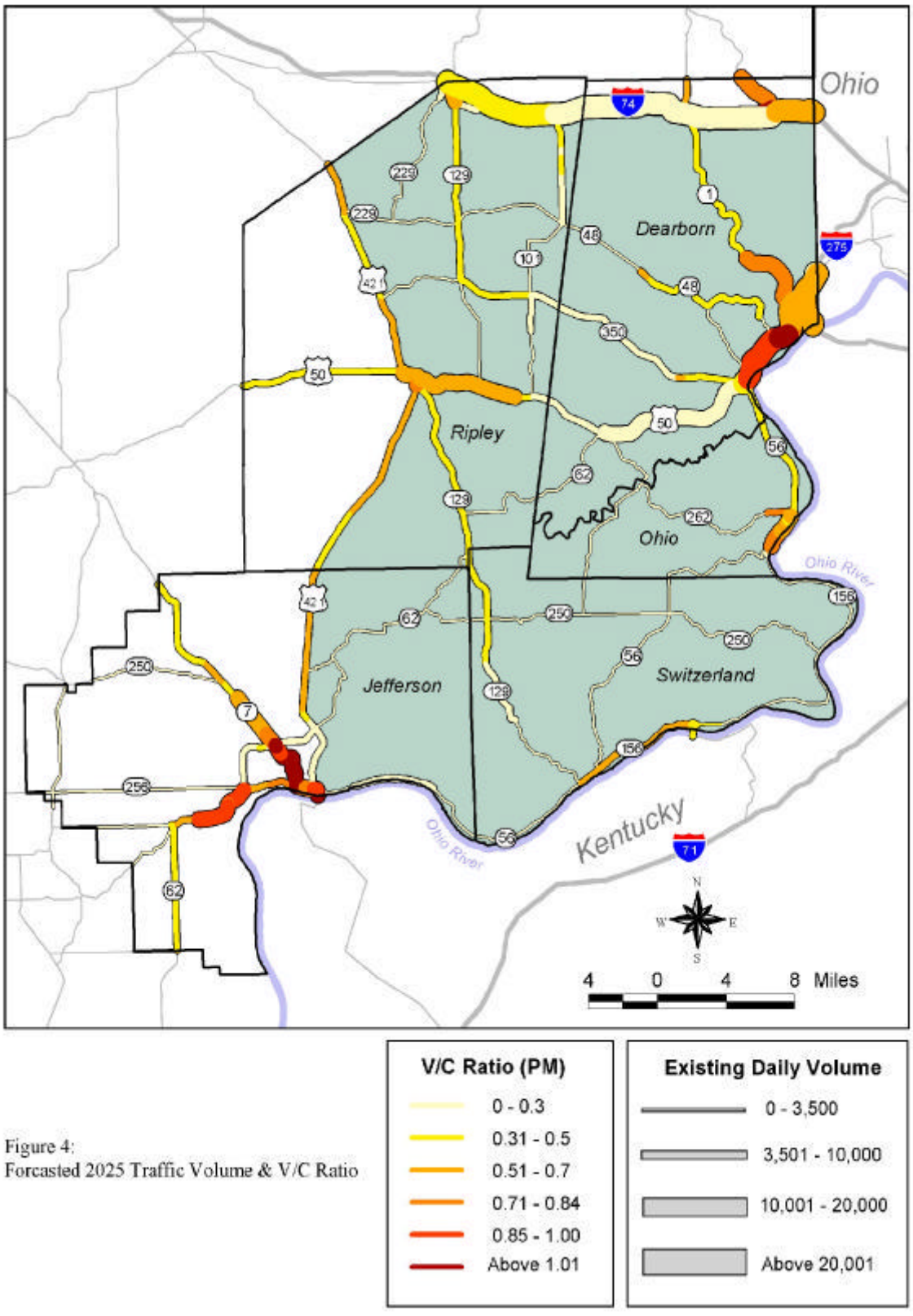


Figure 4:
Forcasted 2025 Traffic Volume & V/C Ratio

## Table 5: Curves per Mile

| Route | County | 55 mph-40 mph | 40 mph- 20 mph | Length | Curves per Mile (55 mph-40 mph) | Curves per Mile (40 mph-20 mph) |
|---|---|---|---|---|---|---|
| SR 3 N | Jefferson | 1 | 0 | 7.07 | 0.14 | 0.00 |
| SR 3 S | Jefferson | 1 | 0 | 7.92 | 0.13 | 0.00 |
| SR 7 N | Jefferson | 5 | 8 | 17.13 | 0.29 | 0.47 |
| SR 7 S | Jefferson | 2 | 10 | 17.14 | 0.12 | 0.58 |
| SR 46 E | Ripley | 0 | 0 | 14.95 | 0.00 | 0.00 |
| SR 46 E | Dearborn | 1 | 0 | 12.78 | 0.08 | 0.00 |
| SR 46 W | Ripley | 0 | 0 | 21.06 | 0.00 | 0.00 |
| SR 46 W | Dearborn | 1 | 0 | 12.69 | 0.08 | 0.00 |
| US 50 E | Ripley | 3 | 0 | 22.12 | 0.14 | 0.00 |
| US 50 E | Dearborn | 1 | 0 | 21.87 | 0.05 | 0.00 |
| US 50 W | Ripley | 3 | 1 | 23.30 | 0.13 | 0.04 |
| US 50 W | Dearborn | 1 | 0 | 21.90 | 0.05 | 0.00 |
| SR 56 E | Jefferson | 7 | 2 | 27.64 | 0.25 | 0.07 |
| SR 56 E | Switzerland | 16 | 15 | 23.12 | 0.69 | 0.65 |
| SR 56 E | Ohio | 18 | 19 | 17.29 | 1.04 | 0.11 |
| SR 56 E | Dearborn | 1 | 3 | 3.58 | 0.28 | 0.84 |
| SR 56 W | Jefferson | 13 | 2 | 27.46 | 0.47 | 0.07 |
| SR 56 W | Switzerland | 18 | 12 | 22.99 | 0.78 | 0.52 |
| SR 56 W | Ohio | 19 | 16 | 19.18 | 0.99 | 0.83 |
| SR 56 W | Dearborn | 0 | 0 | 3.07 | 0.00 | 0.00 |
| SR 62 E | Jefferson | 35 | 24 | 34.78 | 1.00 | 0.69 |
| SR 62 E | Ripley | 14 | 16 | 9.09 | 1.54 | 1.76 |
| SR 62 E | Dearborn | 27 | 6 | 6.98 | 3.87 | 0.86 |
| SR 62 W | Jefferson | 225 | 23 | 34.02 | 0.73 | 0.68 |
| SR 62 W | Ripley | 17 | 15 | 9.05 | 1.88 | 1.66 |
| SR 62 W | Dearborn | 22 | 12 | 7.80 | 2.82 | 1.54 |
| I-74 E | Dearborn | 0 | 0 | 36.48 | 0.00 | 0.00 |
| I-74 W | Dearborn | 0 | 0 | 47.74 | 0.00 | 0.00 |
| SR 101 N | Ripley | 0 | 4 | 17.25 | 0.00 | 0.23 |
| SR 101 S | Ripley | 0 | 3 | 16.45 | 0.00 | 0.18 |

Source: Bernardin-Lochmuller & Associates, Inc. from INDOT Pavement Management System: ì1994 Horizontal Curvature Dataî; INDOT, Division of Roadway Management.

**Table 5 (continued): Curves per Mile**

| Route | County | 55 mph-40 mph | 40 mph- 20 mph | Length | Curves per Mile (55 mph-40 mph) | Curves per Mile (40 mph-20 mph) |
|---|---|---|---|---|---|---|
| SR 129 N | Switzerland | 27 | 9 | 15.55 | 1.74 | 0.58 |
| SR 129 N | Ripley | 3 | 1 | 28.02 | 0.11 | 0.04 |
| SR 129 S | Switzerland | 20 | 9 | 15.56 | 1.29 | 0.58 |
| SR 129 S | Ripley | 3 | 1 | 27.59 | 0.11 | 0.04 |
| SR 156 E | Switzerland | 8 | 0 | 25.76 | 0.31 | 0.00 |
| SR 156 E | Ohio | 0 | 0 | 1.98 | 0.00 | 0.00 |
| SR 156 W | Switzerland | 11 | 0 | 24.77 | 0.44 | 0.00 |
| SR 156 W | Ohio | 0 | 0 | 2.59 | 0.00 | 0.00 |
| I-275 N | Dearborn | 0 | 0 | 2.78 | 0.00 | 0.00 |
| I-275 S | Dearborn | 0 | 0 | 2.80 | 0.00 | 0.00 |
| US 421 N | Jefferson | 0 | 4 | 13.01 | 0.00 | 0.31 |
| US 421 N | Ripley | 3 | 1 | 26.30 | 0.11 | 0.04 |
| US 421 S | Jefferson | 0 | 4 | 19.53 | 0.00 | 0.20 |
| US 421 S | Ripley | 2 | 1 | 30.31 | 0.07 | 0.03 |

Source: Bernardin-Lochmuller & Associates, Inc. from INDOT Pavement Management System: ì1994 Horizontal Curvature Dataî; INDOT, Division of Roadway Management.

## 7 . Accident Rates

Between calendar years 1996-1998, US 50 (which carries the most traffic) had the most accidents in the Study Area, with a total of 304 accidents reported in Dearborn County; and, 86 in Ripley County. Of those accidents, 300 were personal injuries and 4 were fatalities in Dearborn County and in Ripley County, 80 were personal injuries and 6 were fatalities. SR 101 in Switzerland County had the least accidents in the study area with one personal injury reported during 1996-1998. Table 6 provides a summary of the injury and fatality rates for State ì rural arterialî and ì rural collectorî roadways. Compared to the Indiana statewide average, State ì rural arterials and collectorsî had a higher injury rate in Dearborn and Switzerland Counties, and a higher fatality rate in Jefferson, Ohio, Ripley and Switzerland Counties. Excluding US 421 in Jefferson and Ripley Counties, and SR 156 in Switzerland County, all of the State ì rural arterial and collectorî roadways in the Study Area have higher injury rates than Indiana. Referring to Table 7, all of the ì rural arterialsî in the Study Area had higher fatality rates than the statewide average excluding US 50 in Dearborn County, US 421 in Jefferson and Ripley Counties, SR 56 in Dearborn County and SR 156 in Ohio County. The highest ì rural arterialî roadway injury and fatality rates occurred in Switzerland County on SR 56. The injury and fatality rates for ì rural arterialsî are displayed in Figure 5.

The Study Area also has higher injury rates on ì rural collectorî roadways than the State. (Refer to Table 8.) Fifty percent of the ì rural collectorsî in the Study Area have a higher injury rate than the statewide average. Fifty-five percent of collectors have a higher fatality rate than the statewide average. However, 39% of the ì rural collectorsî in the Study Area had no fatalities. The highest injury and fatality rates occurred in Ripley County, on SR 48 and SR 62, respectively.

**Table 6: Summary of Injury and Fatality Rates on State Arterial and Collector Roadways**

| County/State | Daily VMT | Injuries (1996-1998) | Fatalities (1996-1998) | Injury Rate* | Fatality Rate* |
|---|---|---|---|---|---|
| Dearborn | 683,884 | 567 | 11 | 83.7 | 1.6 |
| Jefferson | 422,786 | 249 | 7 | 59.5 | 1.7 |
| Ohio | 94,299 | 62 | 2 | 66.4 | 2.1 |
| Ripley | 400,732 | 245 | 13 | 61.8 | 3.3 |
| Switzerland | 109,894 | 108 | 8 | 99.3 | 7.4 |
| Indiana** | 76,821,212 | 18,654 | 415 | 73.6 | 1.6 |

Source: Bernardin-Lochmueller & Associates, Inc. from INDOT data
Notes: *per 100 million annual vehicle miles of travel
** Indiana totals only include 1998 accidents

**Table 7: Accident Rates for State Rural Arterial Roadways in the Study Area**

| Route | County | Daily VMT | Injuries (1996-1998) | Fatalities (1996-1998) | Injury Rate* | Fatality Rate* |
|---|---|---|---|---|---|---|
| US 50 | Ripley | 111,607 | 80 | 6 | 72.4 | 5.4 |
| US 50 | Dearborn | 348,381 | 300 | 4 | 87.0 | 1.2 |
| US 421 | Jefferson | 118,906 | 28 | 1 | 23.8 | 0.9 |
| US 421 | Ripley | 124,445 | 51 | 1 | 41.4 | 0.9 |
| SR 1 | Dearborn | 100,536 | 63 | 4 | 63.3 | 4.0 |
| SR 46 | Ripley | 14,367 | 21 | 1 | 147.6 | 7.0 |
| SR 56 | Jefferson | 126,562 | 99 | 3 | 79.0 | 2.4 |
| SR 56 | Switzerland | 21,511 | 40 | 2 | 187.8 | 9.4 |
| SR 56 | Dearborn | 30,282 | 20 | 0 | 66.7 | 0.0 |
| SR 62 | Jefferson | 167,458 | 100 | 3 | 60.3 | 1.8 |
| SR 156 | Switzerland | 52,505 | 25 | 4 | 48.1 | 7.7 |
| SR 156 | Ohio | 4,291 | 3 | 0 | 70.6 | 0.0 |
| Other Principal and Minor Arterials | Indiana** | 32,887,879 | 5315 | 210 | 49.0 | 1.9 |

Source: Bernardin-Lochmueller & Associates, Inc. with INDOT data
Notes: * per 100 million annual vehicle miles of travel
** Indiana totals only include 1998 accidents

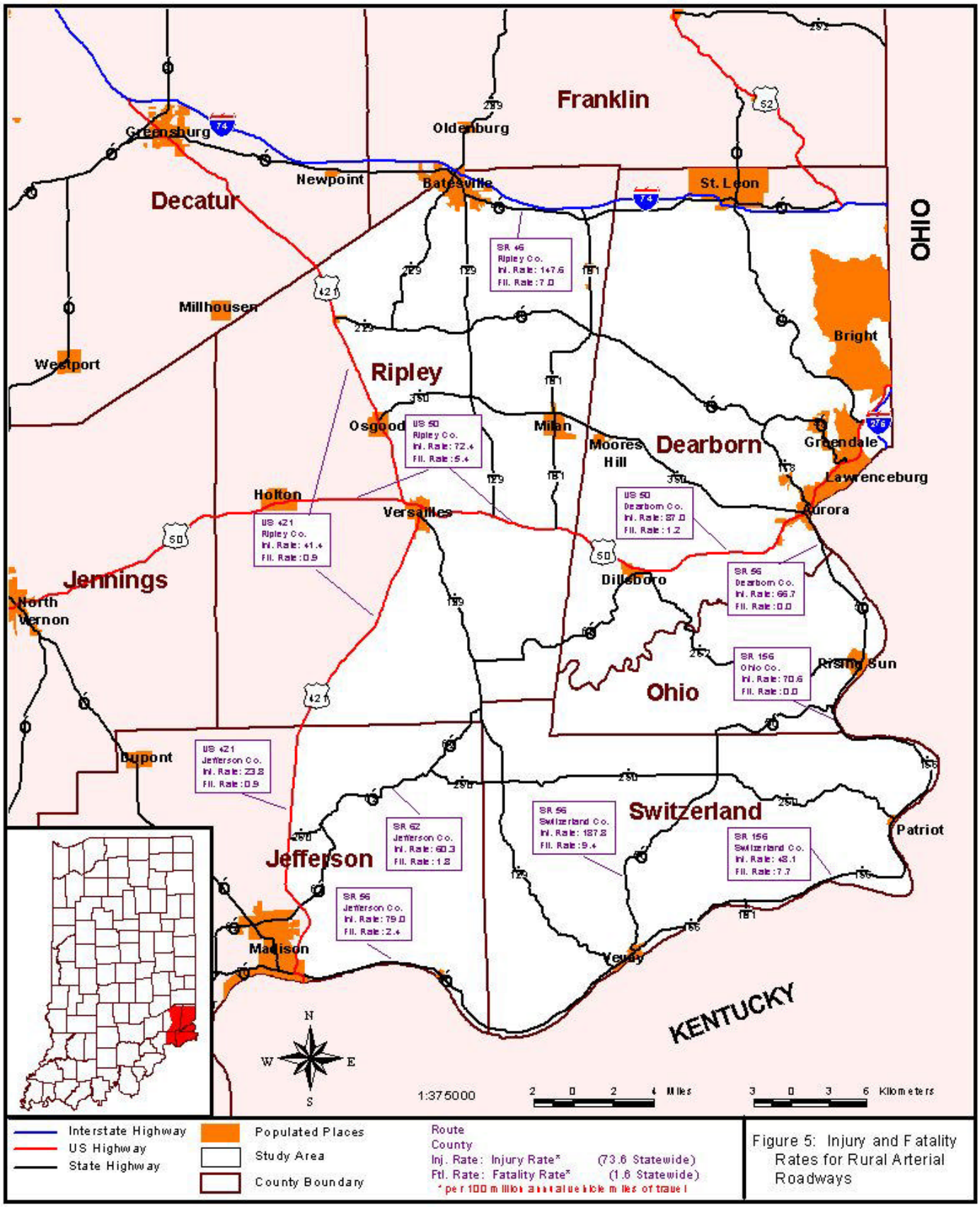


Figure 5: Injury and Fatality Rates for Rural Arterial Roadways

**Table 8: Accident Rates for State Rural Collector Roadways in the Study Area**

| Route | County | Daily VMT | Injuries (1996-1998) | Fatalities (1996-1998) | Injury Rate* | Fatality Rate* |
|---|---|---|---|---|---|---|
| SR 46 | Dearborn | 29,395 | 21 | 1 | 72.2 | 3.4 |
| SR 48 | Dearborn | 66,144 | 77 | 0 | 117.6 | 0.0 |
| SR 62 | Dearborn | 9,221 | 6 | 0 | 65.7 | 0.0 |
| SR 148 | Dearborn | 16,131 | 16 | 1 | 100.2 | 6.3 |
| SR 262 | Dearborn | 5,056 | 9 | 0 | 179.8 | 0.0 |
| SR 350 | Dearborn | 76,305 | 55 | 1 | 72.8 | 1.3 |
| SR 250 | Jefferson | 9,860 | 22 | 0 | 225.4 | 0.0 |
| SR 56 | Ohio | 80,066 | 41 | 2 | 51.7 | 2.5 |
| SR 262 | Ohio | 9,942 | 18 | 0 | 182.9 | 0.0 |
| SR 48 | Ripley | 18,297 | 18 | 0 | 99.4 | 0.0 |
| SR 62 | Ripley | 6,541 | 2 | 1 | 30.9 | 15.4 |
| SR 101 | Ripley | 75,816 | 37 | 1 | 49.3 | 1.3 |
| SR 129 | Ripley | 16,997 | 18 | 1 | 107.0 | 5.9 |
| SR 350 | Ripley | 43,656 | 18 | 2 | 41.6 | 4.6 |
| SR 101 | Switzerland | 911 | 1 | 0 | 110.9 | 0.0 |
| SR 129 | Switzerland | 16,899 | 28 | 1 | 167.4 | 6.0 |
| SR 250 | Switzerland | 18,068 | 14 | 1 | 78.3 | 5.6 |
| All Collectors | Indiana** | 43,933,333 | 13339 | 205 | 92.0 | 1.41 |

Source: Bernardin-Lochmueller & Associates, Inc. with INDOT data
Notes: * per 100 million annual vehicle miles of travel
** Indiana totals only include 1998 accidents

## 8. Bridges

The National Bridge Inspection Standards program, first authorized by the 1968 Federal Aid Highway Act, provides Indiana officials with valuable information for assessing bridge needs. Essentially all of Indianaís bridges twenty feet or more in length have been inventoried and rated for safety and structural adequacy. After being inventoried, INDOT provides a list indicating the following items for each bridge:

- Bridge Number- This number relates to the number assigned to the bridge in the Bridge Inspection Report.
- Facility Carried- The name of the state road on which the bridge is located.
- Feature Intersected- The name of the ditch, stream, river, road or railroad crossed by the bridge.
- Sufficiency Rating- This is the key item; the sufficiency rating (S.R.) represents a composite rating weighted to assess the following qualities of the bridge:
    - Structural Adequacy and Safety
    - Serviceability and Functional Obsolescence
    - Essentially for Public Use

### a. Sufficiency Ratings

Sufficiency ratings vary from 0 to 100, with a lower value indicating a lower degree of sufficiency and a higher degree of need for either replacement or repair. To be eligible for Federal Aid funding, a bridge must be both deficient and possess an S.R. value between 0 and 49.99 for replacement or 50 and 79.99 for rehabilitation. The term deficient indicates that a bridge is either structurally deficient or functionally obsolete. Those bridges rating from 80 to 100 are not eligible for improvements with Federal funds.

**Structurally Deficient (SD).** A structurally deficient bridge is closed or restricted to light vehicles because of deteriorated structural components. According to the Federal Highway Administration (FHWA), a structurally deficient bridge is not necessarily unsafe. Strict observance of the posted allowable traffic load and vehicle speed will generally provide adequate safeguards for those using the bridge.

**Functionally Obsolete (FO).** A functionally obsolete bridge is one that cannot safely service the volume or type of traffic using it. This classification is given to a bridge when the deck geometry, load carrying capacity, clearance, or approach roadway alignment no longer meet criteria for the system of which it is an integral part. According to the FHWA, this type of bridge is not unsafe for all vehicles; however, it has older design features that prevent it from accommodating current traffic volumes and modern vehicle sizes and weights.

### b. Study Area State Bridges

Table 9 shows the listing for deficient and obsolete State bridges in the five-county Study Area. Table 10 summarizes the number and percent of structurally deficient and functionally obsolete State bridges in the Study Area. In the listing for obsolete and deficient State bridges located in the Study Area, 18% (29 of 158) of the bridges had a sufficiency rating lower than 80, indicating the need for replacement or repair. However, only 8.9% (14 of 158) of the bridges are classified as structurally deficient or functionally obsolete. Table 7 reports the location in the Study Area of those State bridges with sufficiency ratings lower than 80. Figure 6 shows the location of the two State bridges with a sufficiency rating of less than 50. (The replacement of the SR 250 bridge over Wades Creek is presently programmed.) Figure 7 displays the State bridges with a sufficiency rating below 80 and greater than 49.99. Although some bridges have a sufficiency rating lower than 80, that does not necessarily indicate that a bridge is obsolete or deficient.

## Table 9: Listing for Obsolete and Deficient State Road Bridges in the Study Area (2000)

| Bridge Number | Feature Intersected | Feature Carried | Sufficiency | Functionally | Structurally |
|---|---|---|---|---|---|
| **Dearborn County** | | | | | |
| 001-15-01683 | Salt Fork | SR 1 | 073.0 | Y | N |
| 001-15-04683 | I-74 | SR 1 | 076.2 | N | N |
| 046-15-03032 | East Fork Tanners Creek | SR 46 | 074.1 | N | N |
| 046-15-01987 | Whitewater River | SR 46 | 072.2 | Y | N |
| 050-15-02169 | CSX RR & 2 Streets | US 50 | 078.7 | N | N |
| 050-15-1232 | Wilson Creek | US 50 | 070.0 | N | N |
| 050-15-00210 | Tanners Creek | US 50 | 042.2 | Y | N |
| 050-15-01680 | Double Lick Creek | US 50 | 071.2 | N | N |
| I74-170-04684 | Whitewater River, Creek | I-74 WBL | 078.3 | N | N |
| I275-0-05639 | Ohio River | I-275 | 078.5 | N | N |
| I275-1-02415 | CSX RR | I-275 | 075.5 | N | N |
| I275-2-05641 | Access Road | I-275 NBL | 088.0 | Y | N |
| I275-2-05651 | Access Road | I-275 SBL | 088.0 | Y | N |
| **Jefferson County** | | | | | |
| 056-39-00459* | Lost Fork Creek | SR 56 | 077.5 | N | N |
| P000-39-02602 | Madison RR | Entrance | 060.7 | Y | N |
| **Ripley County** | | | | | |
| 050-69-00905 | Ross Run Creek | US 50 | 079.3 | N | N |
| 350-69-04093 | Plum Creek | SR 350 | 095.4 | Y | N |
| (421)29-69-009 | Laughery Creek | US 421 | 073.7 | Y | N |
| (421)29-69-009 | Laughery Creek | US 421 | 080.0 | Y | N |
| I74-152-04342 | I-74 | CO RD 1500 N | 069.8 | N | N |
| I74-152-04343 | I-74 | CO RD 600 E | 079.5 | Y | N |
| I74-156-04345 | Little Pipe Creek | I-74 | 079.6 | N | N |
| I74-156-04866 | Branch Little Pipe Creek | I-74 | 077.3 | N | N |
| I74-157-04679 | Pipe Creek | I-74 | 068.0 | N | N |
| **Switzerland County** | | | | | |
| 056-78-00044 | Green Valley Creek | SR 56 | 072.8 | Y | N |
| 056-78-00208* | Indian Creek | SR 56 | 053.6 | Y | N |
| 156-78-01006 | Wades Creek | SR 156 | 080.3 | Y | N |
| 156-78-03120 | Grants Creek | SR 156 | 73.5 | N | N |
| 250-78-06403* | Wades Creek | SR 250 | 36.7 | N | Y |

Source: Bernardin-Lochmueller & Associates from INDOT data

Notes: There were no obsolete or deficient bridges listed for Ohio County.
*These bridges are scheduled for replacement

Compared to Indiana, the percent of obsolete and deficient State bridges in each county in the Study Area is lower excluding Switzerland County. Switzerland County has a higher percent of obsolete and deficient State bridges than Indiana Statewide (19% compared to 16%, respectively). The Study Area, as a whole, has a lower percent of obsolete and deficient State bridges than Indiana (8.89% compared to 16%, respectively).

**Table 10: Summary of Structurally Deficient (SD) and Functionally Obsolete (FO) State Bridges**

| County | Number of Bridges | Number of SD Bridges | Percent SD Bridges | Number of FO Bridges | Percent FO Bridges | Total Number of SD and FO Bridges | Percent SD and FO Bridges | Average S.R. |
|---|---|---|---|---|---|---|---|---|
| Dearborn | 46 | 0 | 0.0% | 5 | 10.9% | 5 | 10.9% | 83.67 |
| Jefferson | 37 | 0 | 0.0% | 1 | 2.7% | 1 | 2.7% | 91.30 |
| Ohio | 8 | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 92.51 |
| Ripley | 46 | 0 | 0.0% | 4 | 8.7% | 4 | 8.7% | 91.15 |
| Switzerland | 21 | 1 | 4.8% | 3 | 14.3% | 4 | 19.0% | 85.60 |
| Indiana | 5,478* | N/A | N/A | N/A | N/A | 877 | 16% | N/A |

Source: Bernardin Lochmueller & Associates from INDOT data
Note: *The number of bridges for Indiana includes state and interstate bridges. Individual numbers for SD and FO bridges were not available for Indiana.

### c. Study Area County Bridges

In addition to State bridges, county bridges were reviewed in the Study Area. In the listing for obsolete and deficient county bridges located in the Study Area, 55% (210 of 381) of the bridges had a sufficiency rating lower than 80, indicating the need for replacement or repair. However, only 43% of the county bridges in the Study Area are classified as structurally deficient or functionally obsolete. All five counties in the Study Area rank above the Statewide average in regards to the percent of SD and FO county bridges. Based on a ranking of 1 with the lowest percent of deficiencies and 92 with the highest percent of deficiencies, Jefferson County is ranked 55th in the State; Ripley County is ranked 61st; Ohio County is ranked 81st; Dearborn is ranked 89th; and Switzerland County is ranked last in the State at 92nd. Table 11 summarizes the number and percent of obsolete and deficient county bridges in the Study Area by county. Compared to Indianaís average percent of SD and FO county bridges (29.3%), the percent of obsolete and deficient bridges in each county in the Study Area is higher. The average sufficiency rating in each county is also lower than that of the Statewide average. Switzerland County has the lowest average S.R. of 47.87, compared to Indianaís average S.R. of 84.4.

**Table 11: Summary of Structurally Deficient (SD) and Functionally Obsolete (FO) County Bridges**

| County | Number of Bridges | Number of SD Bridges | Percent SD Bridges | Number of FO Bridges | Percent FO Bridges | Total Number of SD and FO Bridges | Percent SD and FO Bridges | Average S.R. |
|---|---|---|---|---|---|---|---|---|
| Dearborn | 91 | 34 | 37.4% | 18 | 19.8% | 52 | 57.1% | 66.06 |
| Jefferson | 98 | 15 | 15.3% | 16 | 16.3% | 31 | 31.6% | 74.96 |
| Ohio | 21 | 8 | 38.1% | 2 | 9.5% | 10 | 47.6% | 62.45 |
| Ripley | 131 | 15 | 11.5% | 30 | 22.9% | 45 | 34.4% | 71.65 |
| Switzerland | 40 | 21 | 52.5% | 5 | 12.5% | 26 | 65.0% | 47.87 |
| Indiana Average | 136 | 25 | 18.9% | 15 | 10.4% | 40 | 29.3% | 84.4 |

Source: *2000 Bridge Sufficiency Rating Report for All Indiana Counties* - Local Technical Assistance Program, Purdue University

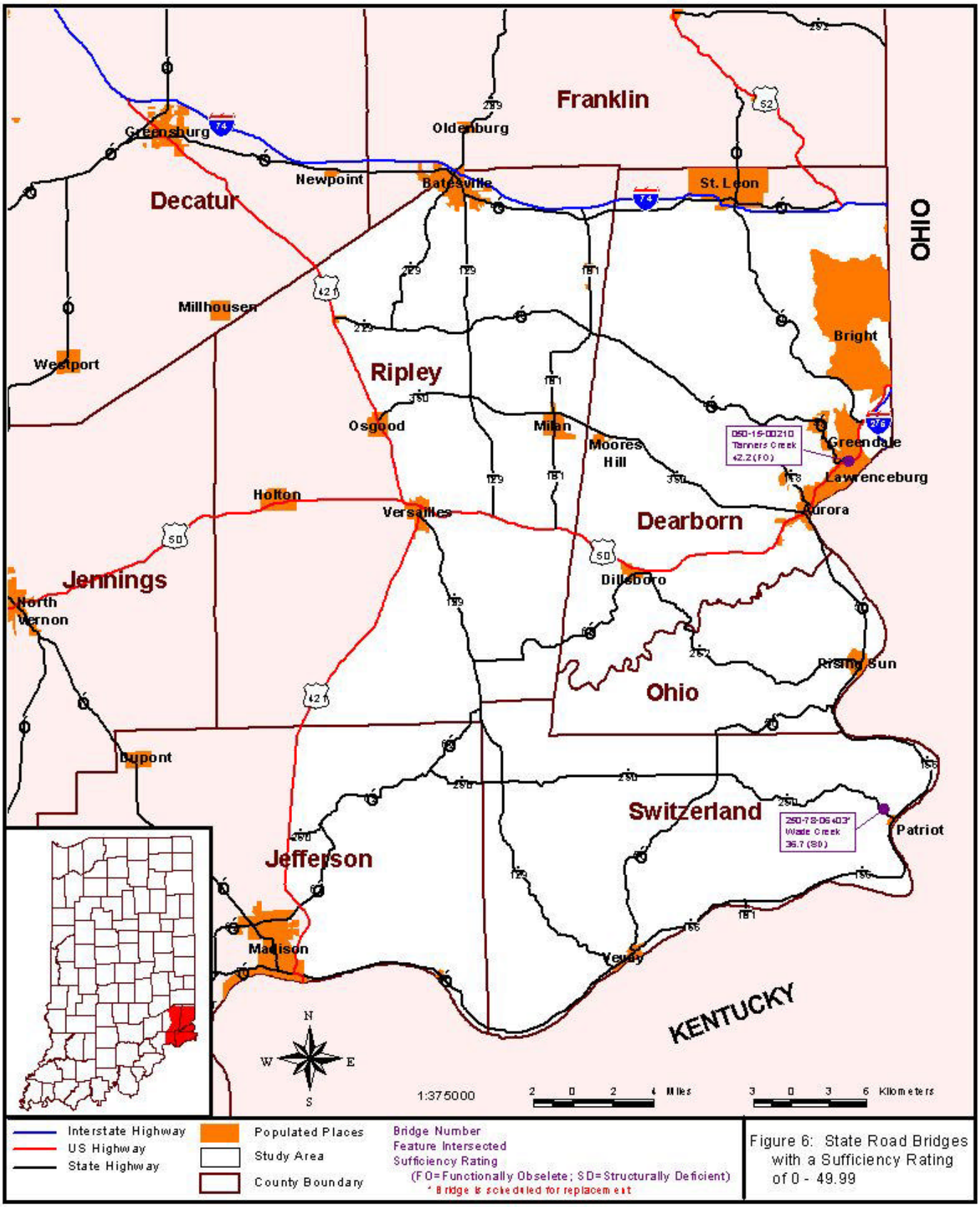


Figure 6: State Road Bridges with a Sufficiency Rating of 0 - 49.99

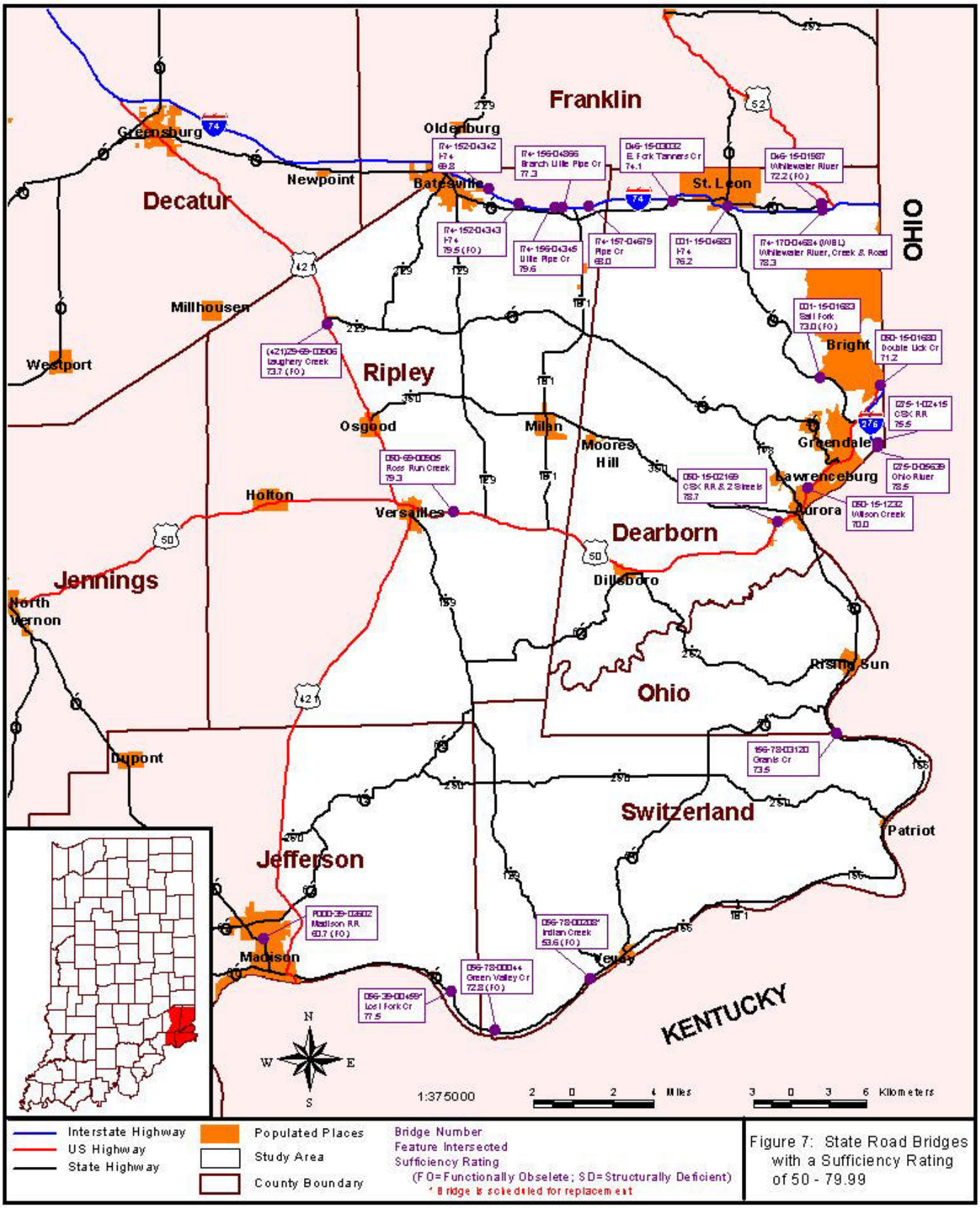


Figure 7: State Road Bridges with a Sufficiency Rating of 50 - 79.99